

REVIEW OF INCONSISTENCIES BETWEEN SUDAS AND IOWA DOT SPECIFICATIONS

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Project Synopsis

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Introduction

The Iowa Department of Transportation's Standard Specifications for Highway and Bridge Construction were originally developed with highway construction in rural areas. As the state continues to develop, an ever-increasing portion of the projects administered by the Iowa DOT take place in urbanized areas. Most of this urban work involves construction on Primary Highways and Federal-Aid roadways through developed portions of counties and/or cities.

Given the rural nature of the existing Iowa DOT specifications, it is often necessary to include supplemental specifications or special provisions on State projects in urban areas. In order to reduce the frequency of this, the Iowa DOT specifications need to be expanded in areas such as water main, storm sewer, sanitary sewer, utility accesses, trenching, traffic signals, etc., which are not typically encountered on rural projects. Given the increasing number of projects that involve urban work, it has been suggested the Iowa DOT utilize the Iowa Statewide Urban Specifications for Public Improvements as the construction specifications for urban roadway projects.

The Iowa Statewide Urban Specifications for Public Improvements were developed by a group of central Iowa communities with a goal of providing uniformity in construction methods and materials. While the Urban Specifications began in central Iowa, their use has grown and are now used in hundreds of communities across the State of Iowa through the Statewide Urban Design and Specifications (SUDAS) program administered by the Center for Transportation Research and Education (CTRE) at Iowa State University.

Based, in part, on the success seen in central Iowa, the SUDAS Specifications are being used and adopted by cities and counties across the state in increasing numbers. This widespread use has resulted in increased construction efficiency for contractors and cost savings to jurisdictions due to the consistency of construction practices being implemented from project to project and the familiarity of the documents by the parties involved in the development and construction of the projects.

As the name "SUDAS" implies, the specifications were developed for public improvement projects located within urbanized areas. With that focus of the specifications, many jurisdictions, including the Iowa DOT, have determined the need to utilize portions of the SUDAS specifications on Primary Highway and Federal-Aid projects within urbanized areas. This project of reviewing the Iowa DOT and SUDAS specifications section by section was established to respond to the needs of these many jurisdictions. This project also includes the development of recommendations for possible changes allowing the SUDAS specifications to be utilized by incorporation or reference with the Iowa DOT specifications while avoiding inconsistencies.

The utilization of the SUDAS specifications on urban Iowa DOT projects appears to be an obvious solution to the insufficient urban specifications within the Iowa DOT standard specifications. Many obstacles must first be overcome to prevent confusion to both the contractor and engineer, ensure consistency from project to project, and to maintain the rural and urban strengths and characteristics of the two manuals. This project outlines those obstacles and recommends a "plan of attack" to address the task of combining the two documents.



Project Objectives

The objectives of this multi-part project were to review the Iowa DOT Specifications and SUDAS Specifications section by section and develop recommendations for possible changes that will allow the two specifications to be used together. This original project proposal included six main objectives as follows:

1. *Identification of Cross References:*

For each SUDAS section, identify all references to SUDAS Division 1. For references to Division 1, propose changes to either the DOT or SUDAS specifications that will allow use of DOT Division 11 with SUDAS Divisions 2-11 only. Also review Division 11 of the Iowa DOT Specifications for references to other Iowa DOT specifications that would be in conflict if Divisions 2 through 11 of SUDAS were used.

2. *Uniformity of Defined Terms*

Compare the defined terms used in the DOT and SUDAS specifications and propose the necessary modifications to each specification to develop a unified set of defined terms.

3. *Identification of Duplicate and Eliminated Bid Items*

Review SUDAS and DOT bid items and list those that would be duplicated (i.e., items covered in both DOT Division 11 and SUDAS Divisions 2-11) or omitted (i.e., items covered only in either DOT Divisions 20-41 or SUDAS Division 1) if the “front-end” (contractual) Iowa DOT Specifications are used with the “back-end” (technical) specifications of SUDAS.

4. *Comparison of Measurement / Payment and Incidental Items*

For each comparable type of bid item, compare the method of measurement and basis of payment information of the Iowa DOT and SUDAS specifications. Based on this review, propose alternatives to the bid items and / or specifications that will eliminate any inconsistencies in these areas. The key is to find a balance that will:

- a. Limit the massive expanse of the size of the DOT bid item list
- b. Maintain the ability to report historical data
- c. Maintain integrity of Iowa DOT’s bid item price history for future estimating
- d. Maintain uniformity so bidders know what to expect (i.e. check for differences in the bid items that are incidental or included in one specification but not the other)

5. *Comparison of Construction Methods*

Review the construction methods in the SUDAS and DOT specifications and identify the differences.

6. *Comparison of Standard Road Plans and Detail Plates*

Identify differences and similarities of the Iowa DOT Road Standards and the SUDAS Figures.



Results

In order to gain feedback and input from the true stakeholders in this project, a committee was formed with representatives from both the Iowa DOT and SUDAS. This committee turned out to be an invaluable resource.

Snyder & Associates compared the documents, identified conflicts, and presented a list of recommended changes. However, at that point, the recommended changes were recommendations only. Fortunately, on many occasions, the committee members were able to work out a resolution to a conflict and obtain a final agreement right there during the meeting. This will save the committee countless hours in future discussions.

During discussions of relatively minor conflicts, the members were able to provide the reasoning or intent behind certain language. This often led to broader, more philosophical, discussions that caused both sides to rethink their current position. Sometimes this resulted in proposed changes, and other times it simply re-affirmed what is currently required.

During the course of the project, the committee gathered for 17 three to four hour meetings. All who were involved agreed that the meetings were a terrific learning experience.

The committee meetings were quite productive as well. The final recommendations of the project produced a voluminous manual, approximately 800 pages long. Due to the size of the document, the report was digitized and placed on a CD. An html-based interface was developed to make finding and utilizing the recommendations of the report quick and simple.

The following information describes the review process and summarizes the findings of the project by objective.

1. Identification of Cross References

Divisions 2-11 of the SUDAS manual were reviewed for references to Division 1. From this review, 24 separate references to Division 1 were identified. A vast majority of these references occurred at the beginning of each section of the technical specifications under the “Submittals” heading. This reference refers the user back to Division 1 for material submittal requirements. The following example is an excerpt from the table in the final report:

Excerpt from Summary of SUDAS Cross References

Division 3 – Trench, Backfill, and Trenchless

Section #	Sub-Section #	Reference
3010	1.03-A	Submit under provisions of Division 1.
3020	1.03-A	Submit under provisions of Division 1.

References within the Iowa DOT Division 11 to Divisions 20-40 were also identified. These references were more varied, but the most common dealt with traffic control and barricades. The following example is an excerpt from the table in the final report:



Excerpt from Summary of Iowa DOT Cross References

1105.14	Placement of Fill Material in Streams	Refers to SRP RL-16. Temporary stream crossing requirements. Recommend spelling out specific requirements in the specification.
1107.09	Barricades and Warning Signs	Refers to section 2528.12 multiple times. Referenced section provided MoM/BoP for furnishing and maintaining barricades and warning signs.
1107.09	Barricades and Warning Signs	Refers to section 2121.07. Referenced section provides construction methods for shoulder drop-offs.

The final report contains the full list of cross-references, and provides recommendations for eliminating the cross-references from the SUDAS technical specifications to the contractual specifications of SUDAS.

2. *Uniformity of Defined Terms*

In order to prevent conflict when the two specifications are used in conjunction with each other, the defined terms in the SUDAS and Iowa DOT front-end sections must be consistent. In order to achieve this, the existing terms were reviewed and compared to identify differences. For those terms that differed, the typical usage of the term within each manual was reviewed, and a recommended change to one or both specifications was made to obtain uniformity.

The review identified 124 Iowa DOT and 71 SUDAS definitions. Obtaining consensus among the committee on the final set of proposed changes proved to be a significant task. There were several terms in particular that the committee struggled to develop a uniform definition including engineer; bid and proposal; highway, road, roadway, and street; and structure. Development of the list of uniform definitions took approximately three months and four committee meetings.

The following is an example from the final report of the definition comparison and recommendations developed by the committee:

Excerpt from Defined Terms comparison and recommendation:

	Iowa DOT	SUDAS	Recommendation
101	Project Area. The right-of-way between the project limits shown on the plans, and immediately beyond these limits if used by the Contractor; also, any additional area which is necessary for the Contractor to place traffic control devices required by the contract documents or necessary to protect the work.	PROJECT AREA. The area of the specified project limits shown on the plans, and any additional area which is necessary for the Contractor to place traffic control devices required by the Contract Documents or necessary to protect the work.	The Iowa DOT definition of Project Area implies that it is within the right of way. The project area could also be within temporary easement. <i>Recommend changing the Iowa DOT definition as follows:</i> <i>Project Area: The area of the specified project limits shown on the plans, and any additional area which is necessary for the Contractor to place traffic control devices required by the Contract Documents or necessary to protect the work.</i>



3. Identification of Duplicate and Eliminated Bid Items

If the Iowa DOT front-end (Division 11) specifications are used in conjunction with the SUDAS back-end (Divisions 2-11), there is the possibility that both manuals may contain bid items for the same work. This conflict would create confusion for contractors.

After reviewing the specifications, there was only one potential duplicate bid item, dealing with structure removal, that was identified, and a recommendation to eliminate the conflict was provided.

In addition to duplicated bid items, there is also the possibility of eliminating current bid items (from either manual) by using the manuals in conjunction with each other. Bid items from the current Iowa DOT master list are effectively eliminated when there is no supporting information within the SUDAS specifications for the item. Upon review, it was determined that a significant number of current Iowa DOT bid items are not covered by the SUDAS specifications. Many of these eliminated items are intended for rural construction (i.e. paved shoulders) or maintenance activities (i.e. patching). Some of the eliminated items are covered in SUDAS, but are measured and paid for differently (i.e. pavement scarification – tons vs. square yards); however, there are still a significant number of bid items that could be utilized in an urban area that are not supported by the SUDAS specifications. A complete list of eliminated Iowa DOT bid items is provided in the final report.

Likewise, a number of items in the SUDAS specifications would be effectively eliminated because there is no corresponding bid item within the Iowa DOT's master list. The more commonly used items include compaction testing, earthwork (lump sum), and brick sidewalks. It was recommended that an Iowa DOT bid item be developed for the commonly and occasionally used SUDAS bid items. The items that are rarely used can be accommodated with an Iowa DOT 2599 item on a project by project basis.

4. Comparison of Measurement/Payment and Incidental Items and review of Construction Methods.

The original proposal called for these items to be evaluated separately. Upon discussion with the committee, it was decided that it would be more efficient to compare all aspects of bid items simultaneously.

This review began by developing a list of comparable bid items within SUDAS and the Iowa DOT. The items were deemed comparable if the scope of work was substantially the same. For each comparable set of bid items, the applicable sections of each specification were compared side by side, and a summary of differences and recommended revisions prepared. An example of the side by side comparisons and recommendations is provided on the next page. It should be noted that this example is very brief, but shows the typical format used for review and comparison; most of the sections reviewed were several pages in length.

The results of the comparison revealed that there are many differences between the two specifications. SUDAS and the Iowa DOT use different units of measurement for some items, but most are consistent. However, SUDAS tends to include more incidentals under each of their bid items than the DOT does.



There were also differences in construction methods and material. As expected, the Iowa DOT provides more complete specifications for pavement related items, while the SUDAS specifications are more detailed in the materials and methods of constructing public utilities such as storm sewer, sanitary sewer, water main, etc.

Example summary of Measurement, Payment, and Construction Methods.

Detectable Warnings

Specification Section	IDOT	SUDAS
	2511: Removal and Construction of Sidewalks and Recreational Trails	7030: Recreational Trails, Sidewalks, and Driveways
Equivalent Items	2511-7528100	(NONE)
Unit	SF	SF
Method of Measurement	DETECTABLE WARNING - CURB RAMP (STD)? The quantity of detectable warnings for curb ramps, in square feet will be the quantity shown in the contract documents.	DETECTABLE WARNINGS Measurement will be in square feet of detectable warnings in place.
Basis of Payment	The Contractor will be paid the contract unit price for Detectable Warnings for Curb Ramps, per square foot. This payment shall be full compensation for furnishing all material, equipment, and labor to construct the detectable warnings for curb ramps in accordance with the contract documents.	
Incidentals	(none)	Sidewalk ramps, additional thickness for thickened edges, grading to meet deviations and driveways, and subgrade preparation (unless specified in contract documents).
Materials	Detectable warnings shall be in accordance with Materials IM 411. (IM mentions truncated dome dimensions). Types of acceptable panels shall be precast, modular, and cast-in-place types only. Surface-applied and stamped concrete types of warning panels shall not be acceptable. Modular Brick Pavers shall comply with the requirements of ASTM C902, Class SX, Type I.	Detectable warnings shall consist of raised truncated domes with dimensions as shown on Figure 7030.14. Pre-manufactured Detectable Warning Panels: Shall have a non-slip surface with raised truncated domes. Modular Detectable Warning Pavers (Brick Pavers): Shall consist of brick pavers with an integral raised truncated dome pattern. Pavers shall comply with ASTM C 902. Detectable Warning Stamps: Concrete stamp shall produce a raised truncated dome pattern. Contrasting color shall be achieved with integrally colored concrete, or by means of a dry-shake stain/release agent.

Materials:

- ◆ Truncated dome sizing is roughly the same. SUDAS requires a 0.9-1.4". DOT only lists a minimum base diameter of 0.9" diameter at the base.
- ◆ Both require 24" distance in traveled direction for warning panel.
- ◆ Both require homogenous coloring during manufacturing. Field painting not acceptable.
- ◆ DOT references ADA guidelines for color contrasting: **Contrast = |(B1 - B2)/B1| x 100** SUDAS does not reference this.
- ◆ DOT specifies that stamped detectable warnings in concrete are not acceptable. SUDAS approves stamped warnings as long as color/stamping occurs according to manufacturer's specifications.
- ◆ DOT references freeze/thaw compliance with ASTM C1262. SUDAS does not reference this.
- ◆ DOT mandates panels be "Federal Yellow #33538" or "Brick Red Federal #22144" or approved equal.
- ◆ SUDAS does not have a section describing material/mix properties of pre-cast panels. DOT does (Materials IM 411).

Recommendations:

- ◆ SUDAS change item unit to SF to match DOT. Item will always be small quantity.
- ◆ SUDAS needs a more descriptive MOM/BOP. There is currently no mention of labor, equipment, or materials.
- ◆ SUDAS clarify or expand acceptable materials for warning panels.
- ◆ DOT: Use current color requirements or as specified in contract documents.



5. *Identify differences and similarities of the Iowa DOT Standard Road Plans and the SUDAS Figures.*

Given that the Iowa DOT Standard Road Plans and SUDAS figures are a direct extension of their respective specification, it is also necessary to eliminate discrepancies between these documents.

To begin, a list of DOT Plans and SUDAS figures that are similar in intent was developed. For each set of drawings, a side by side comparison was done. Differences between the two documents were highlighted and numbered. On a separate sheet, an explanation of each corresponding number was provided.

Below is an example of the summary sheet containing a description of the differences and recommended changes for a set of figures. The corresponding highlighted figures are shown on the next page.

Example cover page from Standard Road Plan and SUDAS Figure Review:

SUDAS 6020.7 DOT RA-54

GENERAL: SUDAS detail is specifically for sanitary sewer. DOT detail does not specify if it's for sanitary or storm sewer, although it is assumed that it applies to both. SUDAS detail is only equivalent to DOT Section C-C (Type 2 Frame).

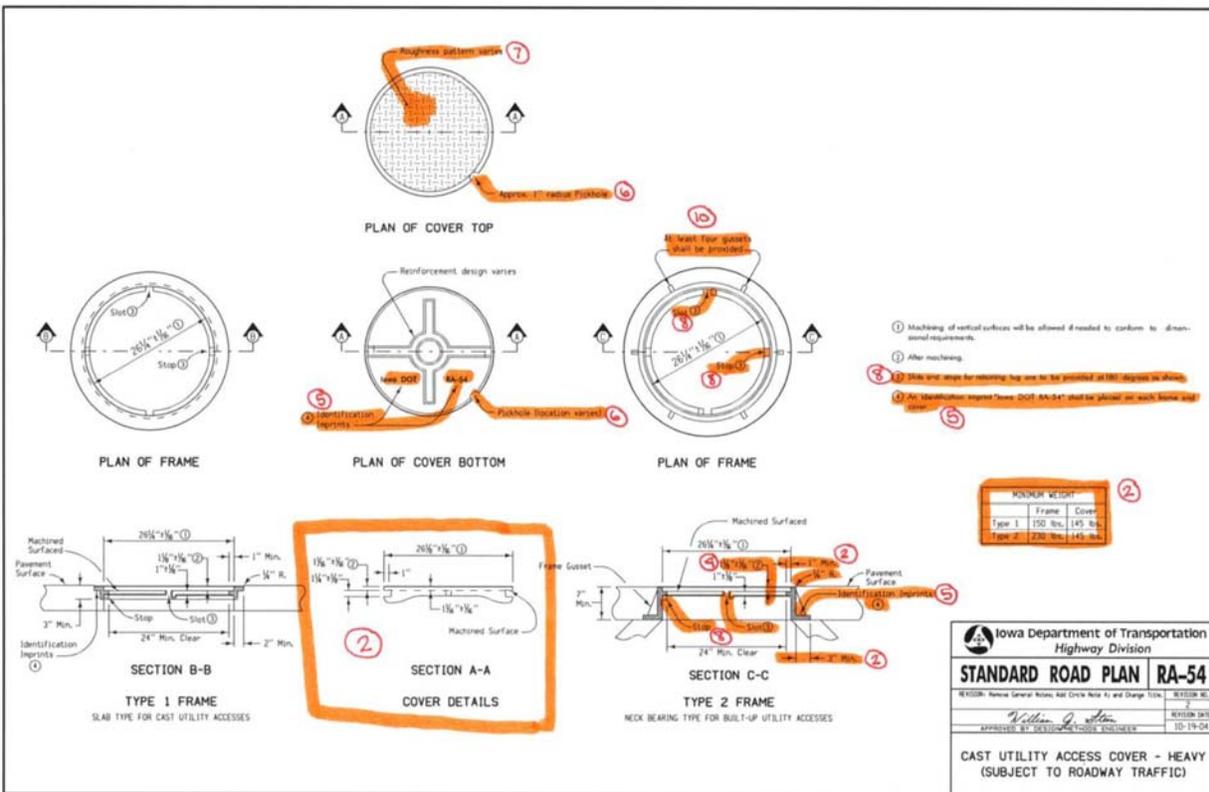
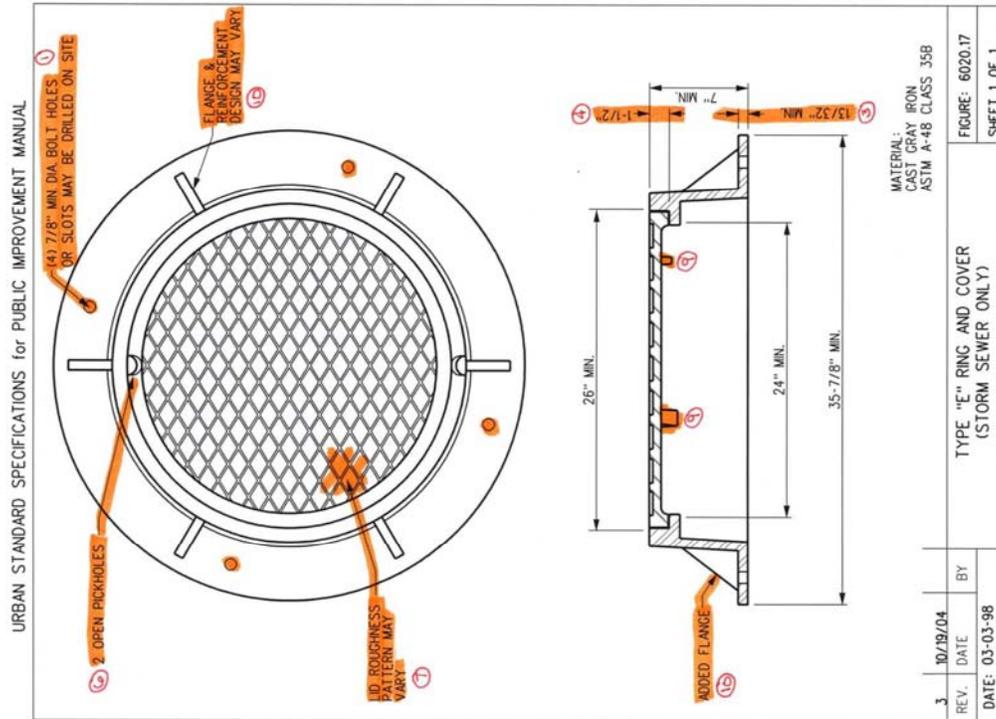
DIFFERENCES:

1. SUDAS detail shows bolt holes around the edge of the rim. DOT does not.
2. SUDAS detail shows gasket seal, DOT does not.
3. DOT detail gives more specific information concerning: dimensions of various portions of the frame, frame and cover weights, machining tolerances, specific shaping and dimensions on lid.
4. DOT requires that the frame and lid be marked to indicate what type they are. SUDAS does not.
5. DOT shows one pick hole. SUDAS detail shows two pick holes. DOT gives a size for the pick hole, SUDAS does not.
6. Both details show a different pattern on the top of the lid, although they both indicate that the pattern will vary.
7. DOT lid shows location of slots and stops. SUDAS detail does not mention slots or stops.
8. SUDAS detail has odd, unlabeled bumps showing on the bottom of the lid in side view.

RECOMMENDATIONS:

- SUDAS beef up the detail to include more dimensions and detail views.
- DOT and SUDAS coordinate precise dimensions of frame and lid.

Example figure comments from Standard Road Plan and SUDAS Figure Review:





Summary:

Throughout the course of this project, a large number of differences were identified between the Iowa DOT and SUDAS specifications. These included differences in definitions, units of measurement and payment, construction materials, construction methods, and details. Addressing all of these differences, and obtaining a pair of specifications that can be used together, without conflict, will be a daunting task.

It should be noted however, that while resolving all of the differences between the two documents will be a major undertaking, it was apparent during the committee meetings that representatives from both sides were open to suggestion and willing to change for the overall benefit of the public. With cooperation from both sides, the elimination of conflicts and possible merging of the two documents may take time, but is certainly achievable.